

REMARKS/ARGUMENTS

Favorable reconsideration of the present application is respectfully requested.

Claims 1-6, 11-24, and 34-46 have been canceled by this Amendment, without prejudice and without acceding to any ground of rejection. Claims 7-10 and 25-33 remain in the application, with Claims 7 and 25 being independent claims. Each of these claims has been amended, as will be discussed in greater detail later.

An objection was raised with respect to the recitation of “third gates” in Claims 1, 7, 14, and 25, in that those claims did not include a recitation of any “first” and “second” elements. Claims 7 and 25 have been amended in the manner recommended in the Official Action, namely to recite “floating first gates” and “control second gates”. Withdrawal of the objection is thus respectfully requested.

An objection to the drawings, specifically, to FIG. 10(c), was made, in that reference numeral 215 used in the specification does not appear on this drawing figure. A proposed replacement sheet for FIG. 10(c) is attached hereto, and element 215 is properly identified thereon. Entry of the replacement drawing sheet and withdrawal of the objection to the drawing are respectfully requested.

Claims 1, 2, 9-12, 14-16, and 34-38 were initially rejected under 35 USC §102(b) as being anticipated by a patent to Maruyama et al. (U.S. 6,034,894). Without acceding to the rejection, Applicant has canceled Claims 1, 2, 11, 12, 14-16 and 34-38. Therefore, of the claims rejected under 35 USC §102(b), only Claims 9 and 10 remain.

Claims 9 and 10, as originally presented, depended from any of Claims 1-5, 7 or 8. The rejection of Claims 9 and 10 under 35 USC §102(b) in view of Maruyama appears to have been directed to these claims in their form as they depended from Claims 1 and 2, in that none of Claims 3-5, 7, or 8, were subjected to the §102(b)

rejection. Claims 9 and 10 have now been amended such that they each depend only from Claim 7 or 8. Because Claims 7 and 8 were not subjected to the rejection under 35 USC §102(b), it is believed that the amendment to Claims 9 and 10 has obviated that ground of rejection.

Withdrawal of the rejection of Claims 1, 2, 4-12, 14-16 and 34-38 under 35 USC §102(b) in view of Maruyama is therefore warranted, and is respectfully requested.

Several different grounds for rejection of the claims were made under 35 USC §103(a). At the outset, it is to be noted that two of these grounds of rejection have been obviated by the cancellation of the claims to which the rejections were directed. Claims 13 and 39 were subjected to two different grounds of rejection under 35 USC §103(a), one being a combination of the teachings of Ahn et al. (U.S. 5,614,747), Maruyama et al., and Ogura, and the other being a combination of Maruyama and Ogura. Claims 13 and 39 have both been canceled, and those rejections have thus been obviated.

Claims 7, 9-13, 25, 26 and 32-38 have been rejected as being obvious in view of a combination of the teachings of the Ahn et al. and Maruyama patents identified above. As noted previously, Claims 11-13 and 34-38 have been canceled by this Amendment. Of the remaining claims, Claims 7 and 25 are independent claims. Without acceding to the rejection under §103(a), these claims have been amended to more particularly recite certain distinctive features of Applicants' invention. These claims are believed to patentably define the invention over the Ahn and Maruyama patents.

The Official Action asserts that the Ahn patent discloses the process as claimed, with the exception of disclosing an embodiment in which a well is formed in

the silicon substrate. The Official Action further asserts that Maruyama discloses the provision of a well of a first conductivity for a semiconductor memory device, and that it would therefore have been obvious to include such a feature in the silicon substrate of the memory device of Ahn.

Regardless as to whether a person skilled in the art would have found it obvious to have applied the teachings of Maruyama to the Ahn disclosure, the asserted combination of the Ahn and Maruyama references fails to render obvious amended Claims 7 and 25. Claims 7 and 25 each recite a process in which, inter alia:

- a first conduction type well is formed in a silicon substrate;
- a plurality of third gates are formed on a first insulator film disposed on the silicon substrate;
- second conduction-type semiconductor regions are formed on the well surface using tilted ion implantation and using a plurality of the third gates as a mask; and
- then forming a first pattern to act as (Claim 7), or which is to become (Claim 25), floating first gates in gaps formed between the third gates.

The language added to Claims 7 and 25 sets the order in which these steps are to be taken, by reciting that the third gates are to be used as masks for producing the second conduction type semiconductor regions, and reciting that the step of forming the first pattern is to be conducted after the semiconductor regions are formed.

Neither the Ahn patent nor the Maruyama patent discloses or suggests a process that is carried out in the recited order. Further, neither of these patents appears to teach or suggest a process in which third gates are used as masks for a tilted ion implantation procedure used to produce the semiconductor regions formed in the well surface of the silicon substrate.

The claimed production sequence is not disclosed or suggested by either Ahn or Maruyama. In Ahn, a select gate or gates 20, asserted in the Official Action as corresponding to the claimed third gates, are formed on a semiconductor substrate 11. Floating gates 13, asserted to correspond to the claimed floating first gates, are then formed adjacent to the select gates 20, on a thin tunnel oxide layer formed over select gates 20. Next, drain and source regions 16, 17 are formed by an n-type ion implantation process.

In the Maruyama patent, the order of producing the elements asserted to correspond to Applicant's claimed first gates (element 13 in Maruyama) and third gates (element 18 in Maruyama) is reversed from that disclosed in Ahn. Like the process in Ahn, however, the Maruyama process involves forming source/drain regions in the silicon substrate after forming both elements asserted to correspond to the claimed first and third gates.

Neither of these patents appears to disclose or suggest a process in which a second conduction type semiconductor region is formed subsequent to the forming of the third gates (with the third gates being used as a mask for tilted ion implantation to create the semiconductor regions), and before forming the first pattern from which floating first gates are formed. As such, neither of these patents can be asserted to render obvious the invention claimed in Claim 7 and 25, either alone or in combination. The same is also true of all claims currently depending from these claims. The present specification notes (see, e.g., page 45) that memory devices produced in accordance with the claimed process will exhibit a reduction in the fluctuation in programming/erasing time between bits. Other advantages obtained by producing memory devices in accordance with the claimed process are noted at least at page 45 of the present specification.

Reconsideration and withdrawal of the rejection under 35 USC §103(a) in view of Ahn and Maruyama is therefore respectfully requested.

Claims 7-10, 25, 26, 32 and 33 were initially rejected under 35 USC §103(a) as being obvious in view of a combination teachings of the Maruyama patent with the teachings of either Japanese reference JP-7-130884 (Takashi) or U.S. Patent No. 5,555,520 to Sudo.

The Official Action recognizes that the Maruyama patent teaches a process sequence that differs from that of Claims 7 and 25. Specifically, Maruyama discloses a process in which the elements asserted to correspond to Applicant's claimed first floating gates and third gates are formed in that order. Claims 7 and 25 call for the third gates to be formed prior to the formation of the first gates. The rejection asserts that it would have been obvious, in view of the teachings of Takashi or Sudo, to reverse the order of formation of the first and third gates of Maruyama, such that the order is the same as that claimed.

Takashi does disclose the formation first of select gates 20, which are asserted to correspond to the claimed third gates, and then the formation of floating gates 15, which are asserted to correspond to the floating gates formed from the claimed first pattern. As is the case with both the Maruyama patent and the Ahn patent, the process disclosed in Takashi (see FIGS. 1a, 1b) involves forming source and drain diffusion layers in the silicon substrate subsequent to the formation of the select gates 20 and the floating gates 15.

Assuming, *arguendo*, that it would have been obvious to a person of ordinary skill in the art to reverse the order of producing the first and third gates of Maruyama, in view of Takashi, the teachings still fail to render obvious the invention of Claims 7 and 25. These claims recite that the second conduction type semiconductor regions

are formed after the forming of the third gates and prior to the forming of the first pattern that is to be used to form the first floating gates. Neither the Maruyama or Takashi references discloses or suggests this fabrication sequence.

Claims 7 and 25 are also not rendered obvious by the Maruyama and Sudo patents. Applicants note that the Sudo patent is directed to the construction of a dynamic random access memory (DRAM), and more specifically to the design and construction of a trench capacitor cell for a DRAM. In contrast, the invention as claimed is directed to a process for producing a nonvolatile semiconductor memory device. The Maruyama patent is also directed to a construction of a nonvolatile semiconductor memory device. Persons skilled in the art of designing and producing such nonvolatile memory devices, when considering further developments in that field, would not look to teachings in the art of designing and producing DRAMs, which are volatile devices. Constructional, functional and operational differences between the two types of devices are such that, when considering possible modifications to the Maruyama nonvolatile memory device, the skilled practitioner would not look to aspects or features presented DRAM construction in the Sudo patent.

The Sudo patent is thus not within the body of potential relevant prior pertaining to the invention as presently claimed, and, as such, is not properly combinable with Maruyama in assessing the patentability of the claimed invention. Accordingly, the invention as claimed in amended Claims 7-10, 25, 26, 32 and 33 is not rendered obvious by a the teachings of the Maruyama patent and the Takeshi reference, nor by the teachings of the Maruyama and Sudo references. Reconsideration and withdrawal of the rejection of these claims under 35 USC §103(a) is therefore respectfully requested.

Claims 2-6, 8, 17-24, 27-31 and 40-46 were rejected under 35 USC §103(a) as being obvious in view of the above-noted combination of Maruyama and the Takashi or Sudo references, further in view of any or all of Clampitt (U.S. 6,150,691), Huang (U.S. 5,682,055) and Fang (U.S. 6,326,293). Claims 2-6, 17-24 and 40-46 have all been canceled herein, thereby obviating this rejection as it pertains to these claims. Claims 8 and 27-31 depend, respectively, from Claims 7 and 25. As discussed above, the Maruyama and Takashi or Sudo references do not render obvious the process set forth in Claims 7 and 25. None of the Clampitt, Huang and Fang patents are asserted to teach or suggest the claimed features that are not disclosed or suggested in the other references. Therefore, the collective teachings of the references fail to render obvious the invention as now recited in Claims 8 and 27-31, for at least the same reasons. Reconsideration and withdrawal of the rejection of Claims 2-6, 8, 17-24, 27-31 and 40-46 under 35 USC §103(a) in view of Maruyama and Takashi or Sudo, taken in conjunction with Clampitt, Huang and Fang, is respectfully requested.

Claims 11-13 and 31-39 were further rejected under the judicially created doctrine of obviousness-type double patenting, in view of Claims 1-6 of U.S. Patent No. 6,438,028. Claims 11-13 and 34-39 have been canceled, thereby obviating the rejection as to those claims. With respect to Claims 31-33 still pending in the application, it is asserted that these claims, “are anticipated and broad enough to encompass scope of Claims 1-6 of the Patent No. 6,438,028”. This statement, even if true, does not establish a basis for a rejection under the doctrine of obviousness-type double patenting. Applicants note that such grounds for rejection, if proper, would seemingly also encompass at least Claims 25 and 26, which are broader in scope than Claims 31-33, in that Claims 31-33 depend from one or both of these claims. Yet, Claims 25 and 26 are not subject to the rejection. Accordingly, as best understood by

Applicants, the rejection of Claims 31-33 is believed to be in error. In any event, Applicant believes that those claims, as amended (in light of the amendments to Claim 25), are patentably distinct from Claims 1-6 of U.S. Patent No. 6,438,028. Withdrawal of the rejection of Claims 11-13 and 31-39 on the grounds of obviousness-type double patenting in view of Claims 1-6 of U.S. Patent No. 6,438,028, is therefore respectfully requested.


Claims 1-39 have been provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-36 and 79-90 of U.S. Application 10/206,982. Claims 1-6, 11-24, and 34-46 have been canceled, thereby obviating the rejection as to these claims. The basis for the rejection is the same as that quoted above, and thus Applicants believe that the Official Action does not contain a legitimate ground for rejecting the current claims under the doctrine of obviousness-type double patenting. Further, Applicant believes that Claims 7 and 25 as amended herein, and those claims depending therefrom, are patentably distinguishable over the cited claims in application Serial No. 10/206,982. Reconsideration and withdrawal of the provisional rejection of Claims 1-39 under the judicially created doctrine of obviousness-type double patenting in view of that application, is respectfully requested.

All claims as now presented are believed to be in condition for allowance. Reconsideration and withdrawal of all objections and rejections, and passage of the application to issue at an early date, are earnestly solicited.

Authorization is hereby given to charge any fee that is deemed to be owed as a result of the filing of this Amendment, to Deposit Account No. 501165. A duplicate copy of this paper is enclosed for deposit account charging purposes.

Respectfully,

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